in the intensity of the energy beams **150**. As will be appreciated by those of ordinary skill in the art, the required output capacity of the energy source **120** to allow adequate detection by the detectors may be based on various factors, such as the size of the touch screen **110**, the expected losses within the touch screen system **100** (e.g., 1/distance^2 losses) and due to and the surrounding medium (e.g., air), speed or exposure time characteristics of the detectors **110**, ambient light characteristics, etc. As will be discussed with respect to subsequent figures, the detectors **130**, **131** transmit data regarding the energy beams **150** (or variation therein) to a computing device (not depicted) that executes software for processing said data and calculating the location of a touch relative to the touch screen **110**.

[0035] FIG. **2** is a block diagram illustrating the exemplary touch screen system **100** interfaced to an exemplary computing device **201** in accordance with certain exemplary embodiments of the present invention. The computing device **201** may be functionally coupled to a touch screen system **100**, either by a hardwire or wireless connection. The exemplary computing device **201** may be any type of processor-driven device, such as a personal computer, a laptop computer, a handheld computer, a personal digital assistant (PDA), a digital and/or cellular telephone, a pager, a video game device, etc. These and other types of processor-driven devices will be apparent to those of skill in the art. As used in this discussion, the term "processor" can refer to any type of programmable logic device, including a microprocessor or any other type of similar device.

[0036] The computing device **201** may include, for example, a processor **202**, a system memory **204**, and various system interface components **206**. The processor **202**, system memory **204**, a digital signal processing (DSP) unit **205** and system interface components **206** may be functionally connected via a system bus **208**. The system interface components **206** may enable the processor **202** to communicate with peripheral devices. For example, a storage device interface **210** can provide an interface between the processor **202** and a storage device **211** (e.g., removable and/or non-removable), such as a disk drive. A network interface **212** may also be provided as an interface between the processor **202** and a network communications device (not shown), so that the computing device **201** can be connected to a network.

[0037] A display screen interface **214** can provide an interface between the processor **202** and a display device **190** (shown in FIG. **1**). The touch screen **110** of the touch screen system **100** may be positioned in front of or otherwise attached or mounted to a display device **190** having its own display screen **192**. Alternately, the touch screen **110** may functions as the display screen **192** of the display device **190**. One or more input/output ("I/O") port interfaces **216** may be provided as an interface between the processor **202** and various input and/or output devices. For example, the detectors **130**, **131** or other suitable components of the touch screen system **100** may be connected to the computing device **201** via an input port and may provide input signals to the processor **202** via an input port interface **216**. Similarly, the energy source **120** of the touch screen system **100** may be connected to the computing device **201** by way of an output port and may receive output signals from the processor **202** via an output port interface **216**.

[0038] A number of program modules may be stored in the system memory **204** and/or any other computer-readable media associated with the storage device **211** (e.g., a hard disk drive). The program modules may include an operating system **217**. The program modules may also include an information display program module **219** comprising computer-executable instructions for displaying images or other information on a display screen **192**. Other aspects of the exemplary embodiments of the invention may be embodied in a touch screen control program module **221** for controlling the energy source **120** and/or detectors **130**, **131** of the touch screen system **100** and/or for calculating touch locations and discerning interaction states relative to the touch screen **110** based on signals received from the detectors **130**, **131**.

[0039] Certain embodiments of the invention may include a DSP unit for performing some or all of the functionality ascribed to the Touch Panel Control program module **221**. As is known in the art, a DSP unit **205** may be configured to perform many types of calculations including filtering, data sampling, and triangulation and other calculations and to control the modulation of the energy source **120**. The DSP unit **205** may include a series of scanning imagers, digital filters, and comparators implemented in software. The DSP unit **205** may therefore be programmed for calculating touch locations and discerning interaction states relative to the touch screen **110**, as described herein.

[0040] The processor **202**, which may be controlled by the operating system **217**, can be configured to execute the computer-executable instructions of the various program modules. The methods of the present invention may be embodied in such computer-executable instructions. Furthermore, the images or other information displayed by the information display program module **219** may be stored in one or more information data files **223**, which may be stored on any computer readable medium associated with the computing device **201**.

[0041] As discussed above, when a user touches on or near the touch screen **110**, a variation will occur in the intensity of the energy beams **150** that are directed across the surface of the touch screen **110**. The detectors **130**, **131** are configured to detect the intensity of the energy beams **150** reflected across the surface of the touch screen **110** and should be sensitive enough to detect variations in such intensity. Information signals produced by the detectors **130**, **131** and/or other components of the touch screen display system **100** may be used by the computing device **201** to determine the location of the touch relative to the touch screen **110** (and therefore relative to the display screen **192**) and to discern whether the touch is indicative of a selection state, a tracking state or a dragging state. The computing device **201** may also determine the appropriate response to a touch on or near the touch screen **110**.

[0042] In accordance with some embodiments of the invention, data from the detectors **130**, **131** may be periodically processed by the computing device **201** to monitor the typical intensity level of the energy beams **150** that are directed across the surface of the touch screen **110** when no touch is present. This allows the system to account for, and thereby reduce the effects of, changes in ambient light levels and other ambient conditions. The computing device **201** may optionally increase or decrease the intensity of the energy beams **150** emitted by the energy source **120**, as needed. Subsequently, if a variation in the intensity of the energy beams **150** is detected by the detectors **130**, **131**, the computing device **201** can process this information to determine that a touch has occurred on or near the touch screen **110**.